Separation of Chemical Mixtures

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Separating Mixtures

- ***Filtration:*** *Separates components of a mixture based upon differences in particle size. Examples: coffee grounds in filtered coffee, or particles from an air stream.*

- ***Crystallization:*** *Separation based upon differences in solubility of components in a mixture. Ideally the impurities are much more soluble in the solvent than the material being purified. Example: rock candy*

- ***Distillation:*** *Separation based upon differences in volatility (boiling points) of components in a homogeneous mixture. Example: gasoline*

Separating Mixtures

- ***Extraction:*** *Separation based upon differences in a compound's solubility between two different solvents, typically immiscible liquids. Examples: ether & H_2O,*

- ***Chromatography:*** *Separation based upon differences a compound's solubility in a solvent versus a stationary phase. Examples: paper, thin layer (TLC), column, gas-liquid (GC); liquid-liquid: (HPLC), reverse phase.*

Filtration

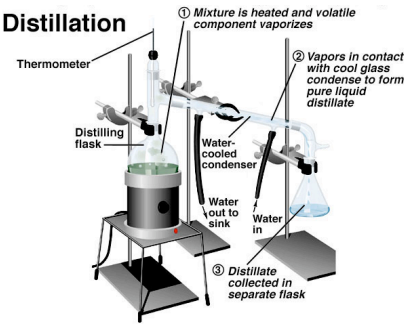
Crystallization

Crystals:
http://crystals.llnl.gov

Eg. rock candy

Recipe & conversion tool:
http://www.exploratorium.edu/cooking/candy/recipe-rockcandy.html
http://www.exploratorium.edu/cooking/convert/conversion.html

Distillation



Similar to oil refining:
http://science.howstuffworks.com/oil-refining4.htm

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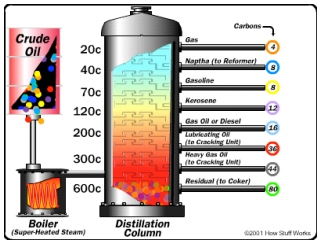
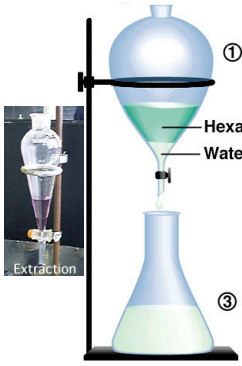


Extraction



① *Hexane shaken with water solution of plant material extracts some dissolved substances.*

Hexane layer

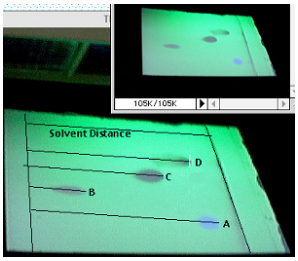
Water layer

② *Upon standing, solutions separate into layers.*

③ *Stopcock is opened to drain bottom layer, and top layer is collected.*

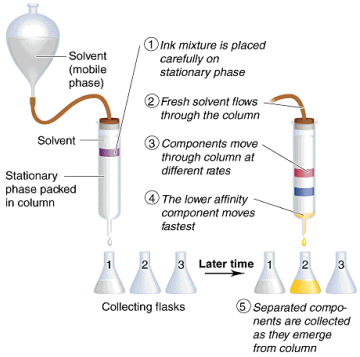
Why do you think that the DEA interested in this process?

Thin Layer / Paper Chromatography

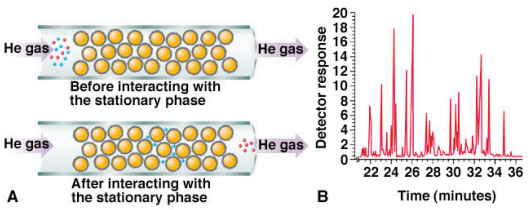


Thin Layer: Stationary phase is coated silica or alumina

Procedure for Column Chromatography



Principle of Gas-Liquid Chromatography



Gas-Liquid Chromatography

GC at DVC